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Four lecideoid lichens new to China

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Abstract — Four lecideoid lichen species — *Bryobilimbia ahlesii*, *B. sanguineoatra*, *Lecidea promixta, Porpidia grisea* — are reported for the first time from China.

Key words — *Lecideaceae*, Asia, taxonomy

Introduction

Lecidea (*Lecideaceae*) was originally described by Acharius (1803). In the sense of Zahlbruckner, the genus once represented one of the largest lichen genera and included about 1200 species (Schmull et al. 2011). Subsequently, *Bryobilimbia*, *Porpidia,* and many other obviously more natural units have been excluded based on the molecular data and the structure of the ascomata, especially the nature of the hamathecial tissues, ascus apical structures, and ascospores (Hertel 1975, 1977; Thomson 1997; Buschbom & Mueller 2004; Smith et al. 2009; Fryday et al. 2014). *Lecidea* s. str. is now a medium-sized genus characterized by a *Lecidea*-type ascus (Hertel 2006, Smith et al. 2009). *Bryobilimbia* is distinguished by a hymenium usually with scattered blue-violet (K+ aeruginose-green) granules, a *Porpidia*-type ascus, and ascospores with a warted perispore or thin gelatinous coat (Fryday et al. 2014). *Porpidia* is characterized by strongly branched and anastomosed paraphyses, a *Porpidia*-type ascus, and large halonate ascospores (Gowan 1989, Nash et al. 2004, Smith et al. 2009).

Bryobilimbia includes six species, *Lecidea* s. str. includes about 100 species (Kirk et al. 2008), and *Porpidia* includes about 50 species (Smith et al. 2009; Osyczka & Olech 2011; Fryday et al. 2014; Fryday & Hertel 2014). In China, 16 *Lecidea* s. str. and 16 *Porpidia* species have been reported (Wei 1991; Abbas & Wu 1998; Aptroot & Seaward 1999; Aptroot 2002; Aptroot & Sparrius

2003; Obermayer 2004; Guo 2005; Zhang et al. 2010, 2012; Wang et al. 2012), but no species of *Bryobilimbia* has yet been reported. During our study of lecideoid lichens from China, we identified four species new to the country — *Bryobilimbia ahlesii, B. sanguineoatra, Lecidea promixta*, and *Porpidia grisea*.

Materials & methods

The specimens studied are preserved in SDNU (Lichen Section of Botanical Herbarium, Shandong Normal University) and KUN (Kunming Institute of Botany, Chinese Academy of Sciences). The morphological and anatomical characters of the specimens were examined under a stereo-microscope (COIC XTL7045B2) and a polarizing microscope (Olympus CX41). Thallus and medulla were tested with K (a 10% aqueous solution of potassium hydroxide), C (a saturated solution of aqueous sodium hypochlorite), I (a 10% aqueous solution of aqueous potassium iodide), and P (a saturated solution of *p*-phenylenediamine in 95% ethyl alcohol) for identification. The lichen substances were identified using standardized thin layer chromatography techniques (TLC) with system C (Orange et al. 2010). Photos of these lichens were taken under Olympus SZX16 and BX61 with DP72.

Taxonomic descriptions

Bryobilimbia ahlesii (Hepp) Fryday, Printzen & S. Ekman,
Lichenologist 46(1): 29 (2014) Fig. 1

Morphology — Thallus effuse, thin, irregularly rimose, grey-green; medulla I–; prothallus lacking. Apothecia sessile, 0.45–0.6 mm diam.; disc reddish brown to brown-black, smooth to slightly convex; true exciple usually prominent and persistent, the outer edge hyaline to pale brown, inner exciple and hypothecium brown to blackish brown; epihymenium hyaline to yellowish brown, K–; hymenium hyaline, 60–80 µm tall; subhymenium hyaline to pale yellowish brown, paraphysis c. 1.4 µm wide, apices slightly widened to 2.8–5 µm, simple or branched in upper part, slightly anastomosed, without apical cap or hood. Asci clavate, *Porpidia*-type; ascospores hyaline, simple, ellipsoid, 12–16(–17.5) × (4–)5–6.25 µm, with or without thin gelatinous coat. Pycnidia not observed.

Chemistry — Thallus and medulla K–, C–, KC–, P–. Hymenium and hypothecium usually with blue-violet (K+ aeruginose-green) granules. No lichen substances detected by TLC.

Distribution — *Bryobilimbia ahlesii* has been reported from Europe and North America (Smith 2009, Halda et al. 2011, Fryday et al. 2014). New to China.

Specimen examined: **China. Heilongjiang**, Wuchang, Mt. Datudingzi, alt. 1150 m, on rock, 21 Aug. 2011, D.F. Jiang 20122253 (SDNU).

Comments — *Bryobilimbia ahlesii* is closely related to *B. sanguineoatra* but differs in wider ascospores and occurring on rock rather than bryophytes.

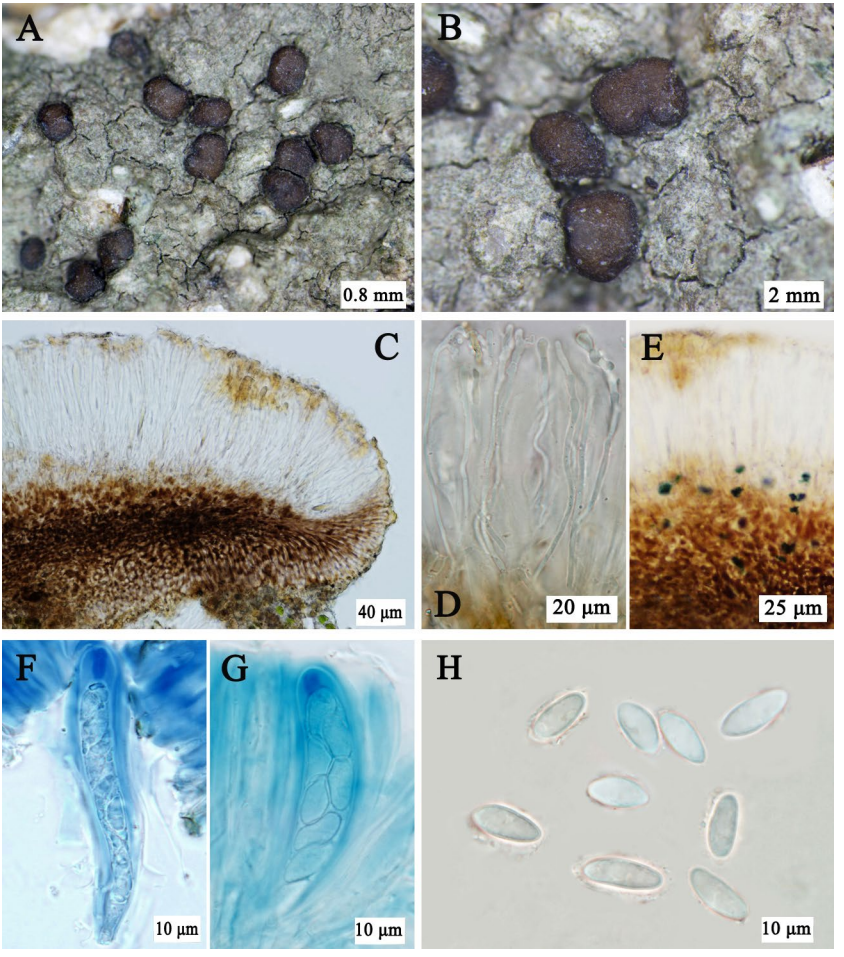

Fig. 1. *Bryobilimbia ahlesii* (Jiang 20122253, SDNU). A: Thallus; B: Apothecia; C: Apothecium section; D: Paraphyses; E: Aeruginose-green K reaction of granules in hymenium and hypothecium; F: Amyloid reaction of ascus; G: Ascus and ascospores; H: Ascospores.

Bryobilimbia sanguineoatra (Wulfen) Fryday, Printzen & S. Ekman, Lichenologist 46(1): 31 (2014) Fig. 2

Morphology — Thallus membranous, thin, pale yellow; I–. Apothecia sessile, 0.7–1.1 mm diam.; disc reddish brown, flat and marginate when young but soon convex and immarginate. True exciple usually exclude, the outer edge pale brown, inner exciple dark reddish brown; epihymenium yellowish brown or almost hyaline; hymenium hyaline, 60–85 μm tall; hypothecium

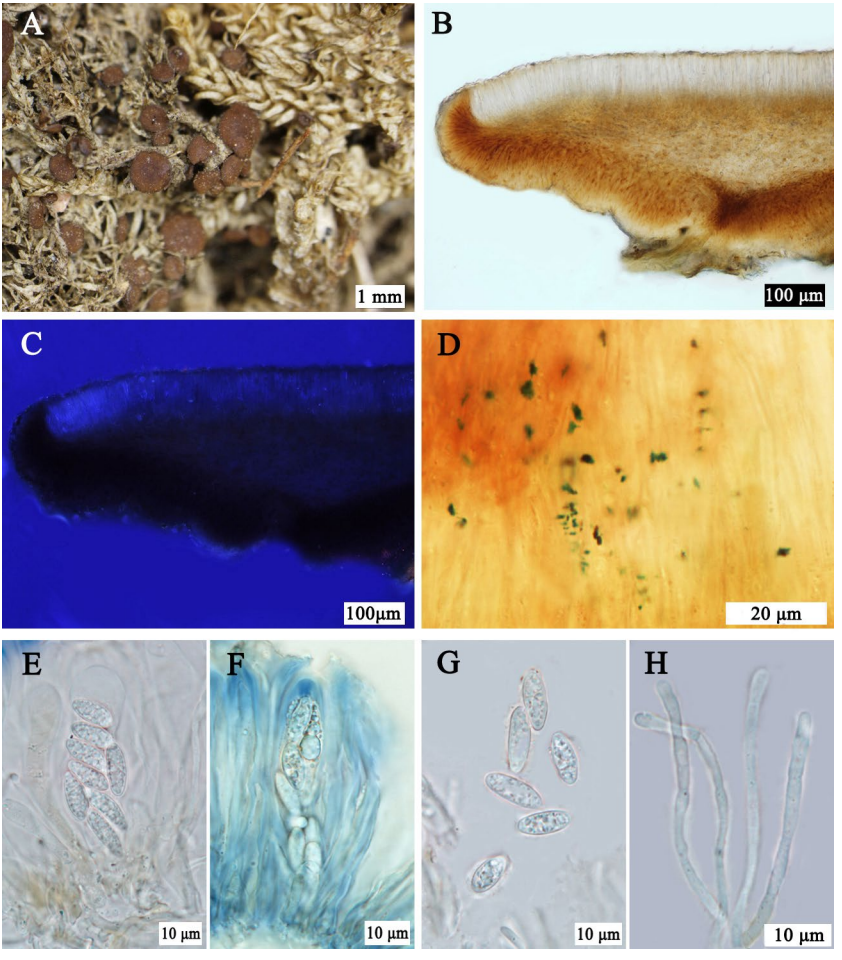

Fig. 2. *Bryobilimbia sanguineoatra* (Wang 14595, KUN). A: Thallus; B: Apothecium section; C: Exciple and epihymenium without crystals; D: Aeruginose-green K reaction of granules in hymenium; E: Ascus and ascospores; F: Amyloid reaction of ascus; G: Ascospores; H: Paraphyses.

above yellowish brown, below usually paler; paraphysis 1.3–1.6 µm wide, apices slightly widened to 2.5 µm, hyaline, mostly simple. Asci clavate, *Porpidia*-type; ascospores hyaline, simple, ellipsoid, (9–)11–14 × 3.5–5(–6) µm, perispore not clearly discernable. Pycnidia not observed.

Chemistry — Thallus and medulla K–, C–, KC–, P–. Hymenium and hypothecium usually with blue-violet (K+ aeruginose-green) granules. No lichen substances detected by TLC.

Distribution — *Bryobilimbia sanguineoatra* has been reported from Europe, Macaronesia, Asia, Africa, and North America (Smith et al. 2009, Davydov & Printzen 2012, Fryday et al. 2014). New to China.

Specimen examined: **CHINA. Yunnan**, Zhongdian, Mt. Bitahai, alt. 3400 m, on moss, 21 Sept. 1994, L.S. Wang 14595 (KUN).

Comments — *Bryobilimbia sanguineoatra* is closely related to *B. hypnorum* but differs in having a more readily excluded true exciple and narrower ascospores that are smooth and never septate; in *B. hypnorum*, the ascospores are often

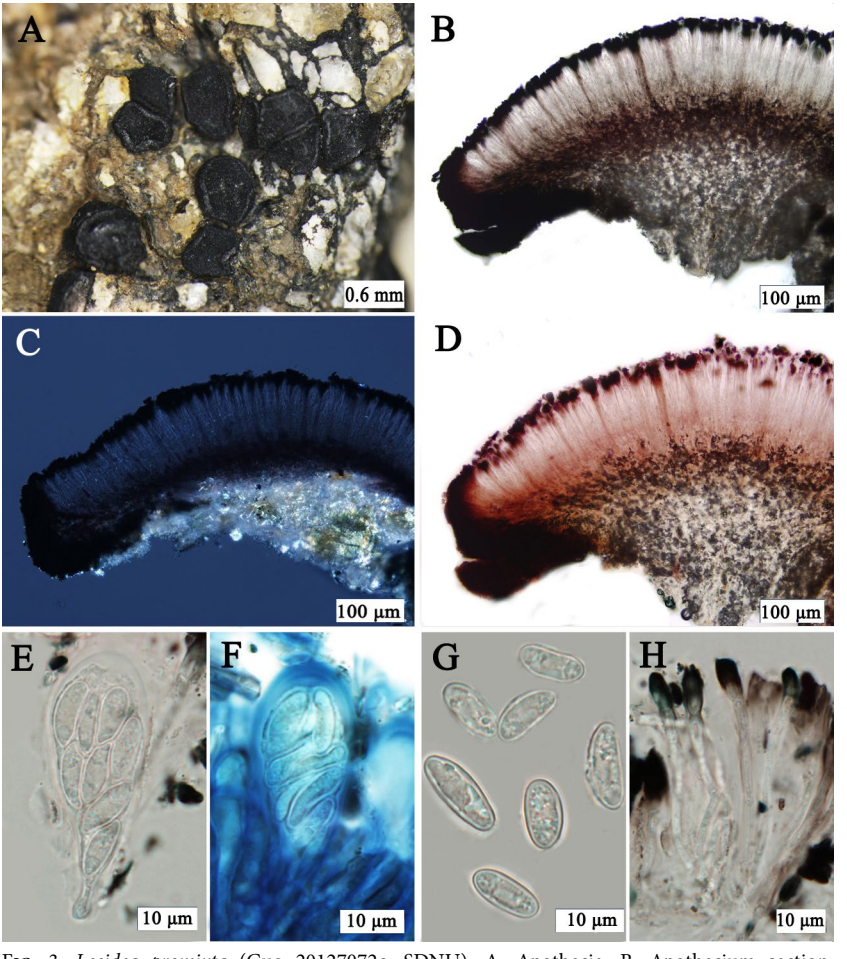

Fig. 3. *Lecidea promixta* (Guo 20127072c, SDNU). A: Apothecia; B: Apothecium section; C: Exciple without crystals; D: Reddish brown N reaction of epihymenium and exciple; E: Ascus and ascospores; F: Amyloid reaction of ascus; G: Ascospores; H: Paraphyses.

thinly 1(–3)-septate, with finely warted perispore, 10–16(–19) × 4.5–6(–7) µm. *Bryobilimbia hypnorum* is distributed in Europe, Macaronesia, Africa, Asia, North America, and the subantarctic islands but is still unknown in China (Smith et al. 2009, Fryday et al. 2014).

Lecidea promixta Nyl., Abh. naturw. Ver. Bremen 14: 490 (1898) Fig. 3

Morphology — Thallus lacking or very indistinct, dark grey, not continuous; hypothallus black; medulla I–. Apothecia sessile, constrict below when mature, 0.3–0.55(–0.65) mm diam.; disc black, plane to convex. True exciple persistent, raised and somewhat swollen, of ± radially arranged swollen hyphae, the outer edge dark brown to black, reddish brown within, without crystals; epihymenium dark green with somewhat brown, irregularly thick, 12–17 mm tall; hymenium hyaline, 40–55 µm tall, I–; hypothecium blackish brown; paraphyses simple or mainly branched only towards the apex, 2.0–3.5 µm wide, the apices capitate and widened to 5.0 µm wide. Asci clavate, *Lecidea*-type; ascospores hyaline, simple, ellipsoid, 10–12.5(–14.5) × 4–5 µm. Pycnidia not observed.

Chemistry — Thallus and medulla K–, C–, KC–, P–. Epihymenium and exciple N+ reddish brown, K–, C–. No lichen substances detected by TLC.

Distribution — *Lecidea promixta* has been reported from Europe (Hertel 2006, Ertz 2008, Liška et al. 2008). New to China.

Specimen examined: **CHINA**. **Shaanxi**, Baoji, Mt. Taibaishan, alt. 3750 m, on rock, 5 Aug. 2005, S.X. Guo 20127072c (SDNU).

Comments — *Lecidea promixta* is closely related to *L. promiscens*, which also has a dark green or green-brown epihymenium and dark brown hypothecium. However, *L. promiscens* contains confluentic acid syndrome, and the medulla is I+ deeply violet (Smith 2009, Zhang et al. 2012), and in China is distributed in Yunnan (Wang 00-19783; KUN).

Porpidia grisea Gowan, Bryologist 92(1): 48 (1989) Fig. 4

Morphology — Thallus crustose, subrimose to rimose-areolate, even to weakly verruculose or rugulose, 0.2–0.7 mm thick, medium gray to pale greenish gray; medulla I+ violet-black; prothallus continuous between thallus patches, black, thin; soredia absent. Apothecia scattered, soon becoming sessile, 0.7–1.8(–2.2) mm diam.; disc black, plane to weakly convex, usually moderately pruinose; pruina grayish white; margin bare, distinct, even to weakly crenulate. Exciple greenish to brownish black at exciple margin, dark brown within, 87.5–140 µm wide, without crystals, with parallel-radiate hyphae, hyphae c. 4 µm wide; epihymenium brown or brownish yellow, without crystals; hymenium hyaline, 80–100(–112.5) µm tall, I+ blue; subhymenium 25–37.5 µm, hypothecium blackish brown; paraphyses strongly anastomosed

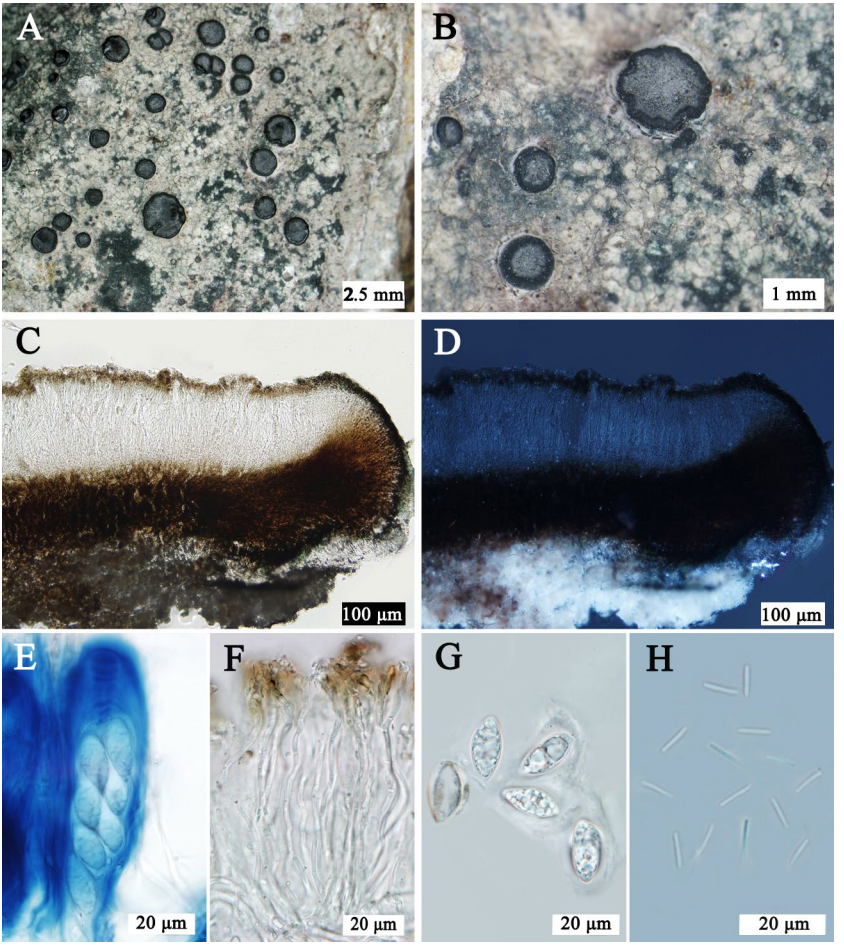

Fig. 4. *Porpidia grisea* (Zhang 20100626, SDNU). A: Thallus; B: Apothecia; C: Apothecium section; D: Exciple and epihymenium without crystals; E: Amyloid reaction of ascus; F: Paraphyses; G: Ascospores; H: Conidia.

and apically branched. Asci clavate, *Porpidia*-type; ascospores hyaline, simple, ellipsoid, 15–20(–25) × 7–8.5(–10) µm, halonate. Pycnidia immersed, conidia bacilliform, 7.5–11.5 × c. 1 µm.

Chemistry — Thallus and medulla K–, C–, KC–, P–. Confluentic acid, 2'-O-methylmicrophillinic acid and 2'-O-methylperlatolic acid were detected by TLC.

Distribution — *Porpidia grisea* has been reported from Europe and North America (Nash et al. 2004). New to China.

Specimen examined: **CHINA. Xizang**, Ridong, Mt. Qimala, alt. 4600 m, on rock, 26 Sep. 1982, M. Zang 4540 (KUN). **Yunnan**, Dali, Mt. Cangshan, alt. 3955 m, on rock, 31 Jul. 2013, L.L. Zhang YN0116, YN0121, YN0135 (SDNU); Deqin, Mt. Baimaxueshan, alt. 4760 m, on rock, 5 Oct. 2009, L.S. Wang 09–31110 (KUN)); Lijiang, Mt. Laojunshan, alt. 3800 m, on rock, 5 Nov. 2009, H.Y. Wang 20100624, 20100625, 20127130, L.L. Zhang 20100626 (SDNU).

Comments — *Porpidia grisea* grows on siliceous or calcareous rock, it is closely related to *P. tuberculosa* and *P. speirea*, all of which belong to the *Porpidia speirea* complex, which produces moderately pruinose apothecia, I+ medulla, and confluentic acid. However, *P. tuberculosa* always has soredia, and the apothecia rarely seen; *Porpidia speirea* usually has a chalky white thallus, and apothecia that remain sunken or very broadly sessile when mature; it grows only on calcareous rock and in China is distributed in Xinjiang (Abdulla 920442, 920455a, 920728, 920746; XJU).

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